AN ANALYSIS OF SEVEN SELECTED FOURTH GRADE SCIENCE TEXTBOOKS

A THESIS

SUBMITTED TO THE FACULTY OF THE SCHOOL OF EDUCATION,

ATLANTA UNIVERSITY IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

BY

HATTIE RUTH CHANDLER JONES

SCHOOL OF EDUCATION

ATLANTA UNIVERSITY

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DEDICATION

To my devoted husband

Isaac Dudley Jones

For his continuous inspiration, interest and encouragement throughout the writing of this thesis

and to

My sweet Mother

Mrs. Ruby J. Chandler

H.C.J.

ACKNOWLEDGEMENTS

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CHAPTER I

INTRODUCTION

Rationale

The task of selecting commercial instructional materials is a responsibility and a necessity confronting every classroom teacher who is to be competent and effective in his teaching endeavors. The vast number of publishers, each proclaiming to offer a sound effective planned series of textbooks, impels teachers to give published materials a realistic examination in light of the learner's achievement status and instructional purposes in his given teaching situation. It is widely assumed that textbooks for instruction have been refined and that publishers are building the contents of these texts upon existing available research in the subject areas. To adhere to such assumptions is sound only if teachers are able to substantiate this premise by weighing the contents of textbooks through careful and extensive analysis.

This concern for textbooks inspections is not to imply that the textbook is to become the curriculum within itself. The concern does focus the importance of choosing the most appropriate available text for satisfying planned instructional objectives as one vital facet of the total curriculum. A modern concept of effective teaching is characterized by the classroom teacher's knowledge of the instructional materials used in his daily teaching chores.

It is against this background of concern and challenge that teachers must strive to provide the educational experiences which will effectively prepare pupils for human conditions which exist today and which are anticipated for the future.

Trends in recent decades that advances in science and technology and social change will play an increasingly important role in the lives of individuals. Thus, more and more, children will be confronted with problems which have deep-roots in the area of science. The role of science in our present-day social and economic problems makes it mandatory for teachers to look for the ultimate goals of instruction beyond the narrow confines of pure science to the implications that result from the technological application of these advances. It is no longer sufficient to regard the end of educational procedures as preparing for some dimly viewed future.

It is evident that we live in a science conditioned world. Science and technology have in the last century changed the physical circumstances of the life of man. Scientific knowledge has been increasing exponentially with major "break-through" in both theory and application occurring on many fronts.[1] Of no lesser importance is the fact that science has increased man's knowledge of his universe, and has largely determined his views of his relationship to the rest of nature.

Every individual who makes any claim on being an educated person must, therefore, have a significant understanding of two aspects of

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[1]William Ramsey and Raymond A. Burckley, Modern Earth Science (New York: Holt, Rinehart and Winston, 1961), p. 78.

science: science as a source of power and science as an intellectual activity that interprets and expand human experiences.[1]

The writer does not believe that a useful knowledge of science can be acquired without a real and disciplined concern with its substantive content.

The growing role of science and technology in shaping the political and economic development of the world demands a most serious examination of our science textbooks at all educational levels. The future requires a scientifically literate citizenry as well as an increased number of highly trained technicians, scientists and engineers.

Problems faced by chlldren are complex. This is true on the one hand because the forces bringing about social and economic change are complex. On the other hand, individuals have different hereditary backgrounds, different emotional patterns or differing sensory equipment to receive impressions from a given situation. Blough, and others state that science must serve the needs and interest of the pupils, that it should be broad in its scope, and that it should deal with the problems that exist in the communities in which the children live. Therefore, textbooks in science for children should be sound in philosophy and content, valid in psychology and functionally effective if children are to have fruitful science experiences in the beginning school years.[2]

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[1] Helen La Fleur, "What Students Need to Know About Science," What The Colleges Are Doing, CXXI (April, 1962), 2.

[2] Glenn O. Blough, Julius Schwartz and A. J. Huggett, Elementary School Science and How to Teach It (New York: Dryden Press, 1951), p. 9.

No matter how much use we make of first-hand experiences in learning science, children must still learn a great deal from textbooks, supplementary books, and other printed material, for it is not possible to learn everything by experimenting and observing. The problem of book selection in science is very much like the problem of book selection in any other field. Probably it needs more attention than it new receives. Obviously, some books serve our purposes better than others because they fulfill certain requirements. Whether the books are for use as basic science texts or supplementary reading materials, some criteria should be kept in mind in selecting them.

Evolution of the Problem

The proposed research evolved from the writers experiences as a graduate student in a class, Science in the Grades in Elementary Education, at Atlanta University. During a discussion of the following questions: "How are science books for your school selected?" and "How would you select science books for your grade level?" there were many vague answers.

After a lengthy discussion, the writer observed that the selection of textbooks were made without the use of any type of instrument for measuring the author's treatment of subject matter. The discussion revealed that many textbooks were selected because of personal opinions, preferences, color of book, attractiveness, and for the teaching aids that accompanied the series.

It is felt that selecting appropriate textbooks is too important to the development of the whole child to be done without having evaluated their contents on the basis of sound criteria. Hence, the

problem for this study evolved.

Contribution to Educational Research

The writer hopes that the information resulting from this study will be valuable for teachers and other professional personnel who are concerned with selecting science textbooks for the fourth grade. It is also hoped that this study will serve as a resource in evaluating various series of science textbooks to be used in the school-wide science program.

To the extent that the study will stimulate others for extensive examination of textbooks and produce information that will influence modernization of today's science curriculum, this study should be of value.

Statement of the Problem

The problem involved in this study was to analyze seven selected fourth grade science textbooks used in the Fulton County Public Schools in order to determine if these books met the standards set up competent science authorities.

Purpose of the Study

The purposes of this study were to accomplish the following tasks:

1. To identify those concepts as outlined by competent science authorities thought to be necessary for the attainment of competency in science textbooks.

2. To determine the extent to which the concepts and elements were included in each textbook.

3. To make a comparison of the selected textbooks in order to determine the ones which exhibits the most of what authorities deem necessary for effectively constructed textbooks.

4. To describe selected science textbooks in terms of physical make-up.

Limitations of the Study

Limitations of this study were as follows:

1. The proposed study was limited to seven selected fourth grade science textbooks used in Fulton County Schools.

2. The checklist results will be the selected data upon which the study will depend.

Definition of Terms

The following terms used in this study were defined as follows:

1. Concept - a network of inferences stemming from observation of objects and events, resulting in the selection of common elements, or like attributes, among the objects and events under observation.[1]

2. Analyze - to examine critically or minutely in order to dtermine the nature or form of the phenomena under investigation.

3. Science textbook - a book used as a basis of instruction for the study of natural, phenomena, describing and explaining them through laws and consequences subjects to verification.

4. Content analysis - is a research technique which deals with the systematic examination of communication content which uses both subjective qualitative appraisal and objective quantitive description.

Method of Research

The Descriptive-Survey Method of research, employing the specific tools of content analysis and the checklist, was used to gather the data.

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[1]Paul F. Brandwein and Elizabeth K. Cooper, Concepts in Science (New York: Harcourt, Brace and World, 1966), p. 7.

Locale of the Study

The central locale of this study was the Trevor Arnett Library, Atlanta University, The Public Library, Atlanta, Georgia, and the home of the writer.

Description of Instruments and Materials

The basic materials used in this study were seven selected and approved science textbooks used in the elementary schools of Fulton County, Georgia, on the fourth grade level 1966-67. A checklist was constructed on the basis of concepts identified by science authorities and approved by competent authorities of the School of Education, Atlanta University. (See Appendix A for specimen of Checklist).

The materials used in this study were:

Title	Company
Probing Into Science	American Book Company
Concepts in Science	Harcourt, Brace and World, Inc.
Today's Basic Science	Harper and Row
Science in Your Life	D. C. Heath
Science for Tomorrow's World	Macmillan Company
Science Is Experimenting	Scott, Foresman and Company
Science	Silver Burdett Company

Method of Procedure

The procedural steps used in conducting this research were as follows:

1. The pertinent literature related to the study was surveyed,

abstracted, summarized and incorporated in the thesis copy.

2. The copies of textbooks to be analyzed were secured from educational publishing agencies.

3. The criteria for examining the science textbooks were examined and selected as dictated by the purposes of the study.

4. The checklist for evaluating the science textbooks was formulated.

5. The contents and style of the textbooks in terms of organization, scope, and concepts were fully described.

6. The data derived from the checklist instrument were organized into appropriate tables or charts as indicated by the purposes of the study.

7. The findings, recommendations and implications which will be helpful to teachers in selecting science textbooks for the elementary school are presented in the finished thesis copy.

Survey of Related Literature

The literature reviewed in connection with this study reveals that a considerable amount of research has been done in the area of book selection on the elementary level during the past few years. This research has contributed much to the selecting of textbooks. This survey of the related literature on the Analysis of Science Textbooks was conducted around the following areas of concern: (a) Significance and Impact of the Textbook, (b) Content Analysis Researches on Textbooks, (c) Researches on Science Programs, and (d) Criterion and Objectives of Science Programs.

Significance and Impact of the Textbooks

In the early days of public education, the textbook, containing

the significant units of the respective subjects, alone determined the curriculum contents. There were few individual reformers who saw the educational program as a whole, but the textbook writers preparing publications in a single subject area were chiefly concerned with their particular subject area.[1]

McNally described the impact of the textbook upon courses of study, syllabi, and publishers in these words:

> It was the textbook writers who, by their selection and arrangement of content, both influenced and created the curriculum of the schools from the time of grades classes in the 1840's. Where the lawmakers fixed the subjects to be taught, the textbook writer prescribed the lessons in these subjects. When new subjects were introduced, the publishers produced the necessary textbooks. Even when courses of study and syllabi appeared later in the nineteenth century, these tended to follow the content in available textbooks rather than vice versa. One obvious means of curriculum improvement was the production of better textbooks.[2]

Today, curriculum improvement is indirectly determined by the objectives formulated by national, state and local educational organizations. Since, however, these objectives guide the authors and publishers of textbooks and supplementary books, these books still largely determine the basic instructional material at all levels.

The textbook, along with lectures and the chalkboard, is given a prominent role in education. Although the textbook is primary a source for verbal communication, many modern textbooks include a rich variety of pertinent visualizations through diagrams, charts, drawings,

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[1] June E. Lewis and Irene C. Potters, The Teaching of Science in the Elementary School (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961), p. 2.

[2] Harold J. McNally, Improving the Quality of Public School Programs (Columbia: Teachers College Bureau of Publication, 1960), p. 30.

and photographs. The textbook is economical and provides the teacher and pupils with an organized approach to subject matter.[1]

According to Weaver, "The easiest way to discover what is done, what is covered, and how much time is spent on any one topic in the conventional program is to examine the textbook used."[2]

Tanner appears to share the same opinion as Weaver, for he states:

> Most textbooks arrange the subject matter in a logical and systematic manner that, conveniently coincides with the subject-centered curriculum. Under this system, many teachers find it easy to follow the textbooks, page by page and chapter by chapter. The curriculum is kept up to date by following the simple policy of adopting new textbooks every so often.[3]

To many experienced teachers, they feel that the textbook does not give them enough latitude. They feel that the use of varied reference materials and a multiplicity of textbooks broadens a course and widens the perspective of pupils. A few creative teachers develop their courses, year by year, without the use of any regular textbook. A textbook for each course taught is still prescribed in several states though the laws dealing with textbooks now permit adoption of several textbooks for each course. Where this is done, the teacher is free to choose one or more texts from the list.[4]

Textbook companies and agencies responsible for instructional

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[1]Daniel Tanner, Schools for Youth (New York: The Macmillan Co., 1965), p. 232.

[2]Edward K. Weaver, "Science and the Curriculum," School Science and Mathematics, LIX (February, 1959), 138.

[3]Tanner, op. cit., p. 232.

[4]L. O. Taylor, The American Secondary School (New York: Appleton-Century-Crofts, Inc., 1960), p. 215.

materials should be encouraged to upgrade and update all teaching materials used for education.[1] A recommendation on keeping content up-to-date was made by the committee on the NEA Project on Instruction. It states that, "Each curriculum area should be under continuous study and evaluation and should be reviewed periodically."[2] One purpose of such review is to determine whether recent findings in the academic discipline are, or should be, reflected in the instructional program. These reviews should utilize the knowledge and skills of the teacher, the school administrator, the scholar in the academic discipline, the scholar in the profession of teaching, and the informed lay citizen, with each contributing his special competence to the total task. The selection of the textbooks for use in the schools must remain the responsibility of the duly constituted school authorities.[3]

Here is how one situation is approached:

> In Newton, Massachusetts: Each school principal is supplied by the Division of Instruction with a list of textbooks recommended by textbook committees and approved for purchase by the School Committee. Standing, city-wide textbook committees with representatives from all grade levels are maintained in all subject fields. Committee membership is on a rotating basis with classroom teachers as chairmen. Systematic annual examination of new textbooks is carried on, usually in March and October; previously approved books are reviewed periodically as necessary. Standardized work sheets based on criteria and policies agreed upon by the committee chairman are used by all work groups to the extent that they are pertinent to the particular subject. Publishers' representatives are consulted when it seems wise to do so.[4]

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[1] Education for Freedom and World Understanding (Washington, D.C.: U. S. Department of Health, Education and Welfare, United States Government Printing Office, March, 1962).

[2] National Education Association, From Bookshelves to Action (Washington, D. C.: National Education Association, 1964), p. 16.

[3] Ibid., p. 16.

[4] McNally, op. cit., p. 30.

Content Analysis Researches on Textbooks

Many studies have been conducted at Atlanta University using the technique of content analysis. Haynes made a study to analyze some basic and auxiliary textbooks for the teaching of social studies at the fifth grade level to determine the extent to which the books emphasized uniform activities and concepts which lead to competent living in a democratic society.[1]

Wilborn set out to make a comparison of content analysis and children's reactions to selected types of magazines. She wanted to see how the magazines were alike and different in terms of format, organization, special features and literary content.[2]

Jacobs studied the range, variety, quality and subjects treated in three educational journals.[3]

Betty Mullins, in 1965, analyzed in great depth six chemistry textbooks according to fifty units or areas of theory. The units were voted the most valuable by chemistry departments according to a survey conducted by Professor Mechamkins. Mullins found that these books differed in their course of study but conformed extensively to the

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[1] Maurice W. Haynes,"A Content Analysis of Fifth Grade Social Studies Textbooks" (unpublished Master's thesis, School of Education, Atlanta University, 1963), p. 49.

[2] Bessie Hamilton Wilborn, "A Comparison of Content Analysis ans Children's Reactions to Selected Types of Magazines" (unpublished Master's thesis, School of Education, Atlanta University, 1964), p. 6.

[3] Margaret A. Jacobs, "A Content Analysis of Three Educational Journals" (unpublished Master's thesis, School of Education, Atlanta University, 1962), p. 6.

valuable units in general chemistry.[1]

Nwokorie studied the treatment of Africa and the African in Georgia public schools textbooks. He was able to obtain valuable information on the manner which authors and publishers treat the African and his country.[2]

Robert J. Chinnis, University of Pennsylvania, made an analysis of six widely used elementary science textbooks. The main purposes were to ascertain the manner and extent of development and grade level placement of certain physical science principles. The most important aspect of this study was that the criteria may be helpful in the selection of science textbooks for instructional purposes.[3]

Hadden and Smith of Kent State University made an analysis of some commercial arithmetic texts available for elementary schools. They found that the readability level was above the assigned grade level and concluded that the arithmetic material must be lowered or the reading level of the child must be improved or both.[4]

Irwin made a study to determine the elements of a good program in children's literature as reported by principals of schools judged

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[1] Betty Mullins, "A Content Analysis of Six High School Chemistry Textbooks" (unpublished Master's thesis, School of Education, Atlanta University, 1962), p. 129.

[2] Sunday I. Nwokorie, "Treatment of Africa and the African's in Georgia Public School Textbooks" (unpublished Master's thesis, School of Education, Atlanta University, 1962), p. 7.

[3] Robert J. Chinnis, "Analysis of Elementary Science Textbooks," The Science Teacher, XXX, No. 1 (February, 1963), pp. 23-27.

[4] James W. Hedden and Kenneth J. Smith, "The Readability of Elementary Mathematics Books," The Arithmetic Teacher, XI, No. 7 (November, 1964), 466-68.

to have strong programs. She devised a checklist which may provide guidelines for a teacher or school desiring to evaluate a local program.[1]

In making a study to determine the extent to which textbooks in educational administration emphasize concepts and theories basic to the training of specialized educational administrators, Harris concluded that most of the selected textbooks treated the same area, and there appeared to be an agreement on the crucial ones. The concepts, principles, and theories found in the textbooks provided a wide latitude of opportunity for the training of administrators.[2]

Hofman made an analysis of the dreams of eighteen first graders as part of a longitudinal research project on readiness. The project was sponsored by the Merrill Palmer Institute, Detroit, Michigan, Henry Ford Museum and Greenfield Village Schools, Dearborn, Michigan, and Henry Ford Hospital in Detroit, Michigan. The children ranged chronologically from 5.11 to 6.10 years of age. His findings revealed that there is more in a child's life than the outward manifestations of his daily behavior indicate. He found listening to a recital of children's dreams give insight into their lives that can never be gained through observation of their school behavior alone.[3]

In the perusal of the literature of the identification of science

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[1] Martin E. Irwin, "Evaluating Elementary Literature Program," Elementary English, XXXX (January-December, 1963), 846-900.

[2] Jimmie Edward Harris, "Content Analysis of Ten Educational Administration Textbooks" (unpublished Master's thesis, School of Education, Atlanta University, 1964), p. 6.

[3] Helmut Hofmann, "Children's Dreams," Childhood Education, XXXX (November, 1963), 143-46.

concepts, the writer found the following studies had been made and incite the results in the following paragraphs.

Researches on Science Programs

Mary Sheckles relates from her study that concepts are ideas or generalized thoughts concerning the different phenomena one deals with throughout life.[1] She lists the basic science concepts as (1) time, (2) space, (3) change adaptation, (4) variety, (5) interrelationships, and (6) energy.

Craig found that for meaningful learning, the content must be selected on sound principles. It must be designed with the abilities, the drives and the capacities of the children in mind.[2]

Heiss agreed with Craig and added that concepts fall into two general groups: concepts which are gained through simple sensory perception and concepts which are gained their meaning from theories proposed by the theoretical scientists who draw upon investigation in the field of pure mathematics.[3]

From his study, Richardson concluded that the following are distinguished characteristics of elementary school science:

1. Problem-centered units of study.
2. The total learning situation.
3. Direct first hand experiences for the pupils.
4. Planning science in relation to the needs and abilities of the pupils, and

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[1] Mary Sheckles, Building Children's Science Concepts (New York: Teachers College, Columbia University Press, 1958), p. 6.

[2] Gerald S. Craig, Science for Elementary School Teacher (Boston: Ginn and Co., 1958), p. 3.

[3] Eldood D. Heiss, Odum Ellsworth, and Charles W. Hoffman, Modern Science Teaching (New York: The Macmillan Co., 1950), p. 55.

5. Group planning involving the teachers, pupils and often science consultants and administrators.[1]

Porter found in a recent study that elementary school science has long been the curriculum step-child. For many years it was not a recognized area in many schools. Now, young children know more about science than any other area at the time they start their schooling.[2]

Studies in history, motion picture and propaganda have been conducted using the technique of content analysis. Mouly states that without analysis to provide a deeper insight into their basic nature, the adequate description of phenomena is relatively impossible.[3]

Science Education

Science is a body of information and principles that help us understand the world around us from atoms to stars, from microscopic water life to man. In another sense, science may be regarded as a method of discovery the method by which new information is uncovered, new principles arrived at, old principles modified or discarded.

There are certain science principles that every elementary school should follow in science education.[4]

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[1] John S. Richardson, Science Teaching in Secondary Schools (New York: Prentice-Hall, Inc., 1957), p. 58.

[2] T. R. Porter, "Recent Advances in Elementary School Curricula," Science and Mathematics, LXVI, No. 2 (February, 1964), 146.

[3] George G. Mouly, The Science of Educational Research (New York: Appleton-Century-Crofts, Inc., 1963), p. 281.

[4] Herman Schneider and Nina Schneider, Science in Your Life (Atlanta: D. C. Heath and Company, 1965), p. 321.

1. A good science program is strongly structured. It provides a framework of concepts rather than a surface of isolated facts.
2. A good science program contains a balanced selection of concepts from each area of science. It develops these concepts in a spiral progression throughout the grades.
3. A good science program is geared to the children's developmental needs--physical, mental, and emotional.
4. A good science program is strongly related to the total school program. Many of the science topics are crossed connected with other curriculum areas, especially social studies, health and mathematics.
5. A good science program carries its responsibility to the future. It provides the scientific literacy and rational attitudes that are essential for citizenship in this scientific age.
6. A good science program provides a framework of concepts, built up through experiences, on which to build future learning.

The present trend in science teaching is to emphasize key concepts rather than specific facts. Specific facts are included but they are seen in relationship to the key concepts. These key concepts are the backbone of science.

Science teaching is good only if it is based on sound objectives and if it keeps to the method intending to accomplish them.

Looking at science learning today we find that methodology is a

necessary part of the pupils classroom experiences. Science provides opportunities for pupils to be critical minded; to be willing to look for new information and to change their opinion of evidence indicates a change is desirable and to be capable of establishing values.

Some years ago Mallinson and co-workers analyzed the intermediate grade textbooks of five unindentified series. The researchers found that most of the textbooks for fourth grade were far too difficult, the text books for fifth grade were quite difficult and the textbooks for sixth grade were somewhat difficult.[1]

The task of science education is a much larger one than discovering children of exceptional ability in science and starting them on their way to becoming scientists. In a democratic society, education involves consideration of the potentialities of the individual's contribution to the total society. The task involves education for all pupils for their own and society's benefit. Only incidentally does it involve concern for the future of science. It is equally apparent, although it is equally important, the application of the invention and discoveries of science, through intelligent action, can establish a much higher standard of living in a world in which the invention and discoveries of science are applied for the benefit of all people.

In view of the above, educators must realize that the preservation of the democratic society is nurtured in the education of its children.

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[1] George G. Mallinson and Others, "The Reading Difficulty of Textbooks in Elementary Science," Elementary School Journal, LI (April, 1950), 460-63.

In a democratic society, education involves consideration of the potentialities of the individual's contributions to the total society. It is quite apparent that unless man becomes intelligent about science he can reap disaster on such a great scale as to wipe out our civilization. All of our people, in a democracy, have the responsibility for determining how science shall be utilized for the society. This responsibility calls for a curriculum, textbooks, and teachers designed to the development of the intelligent citizenry.

There is a tremendous need for understanding, on the part of the citizenry, of the role which science can and does play in society sufficient to enable the great majority of the people who will not actively engage in scientific pursuits to collaborate with those who are and be able to intelligently criticize and appreciate the impact of science upon society.

Summary of Related Literature

The related literature pertinent to this study was reviewed and found to be summarized with the analysis of content and science concepts being identified. The pertinent literature may be summarized into the significant statements to follow.

1. Many studies have been done employing the content analysis technique.
2. Tht text must be accurate.
3. The text should be written in accordance with its purpose.
4. The organization and development of the text should, be in accordance with a philosophy of science education.
5. The text should introduce the concepts or generalizations of science education.

6. The text should be attractive, of suitable size and durable.

7. The type and page format should make for readability and pleasing to the eye.

8. The paper should be of good quality.

9. The style of writing should be understandable and interesting.

10. The text should fit into a general plan of a course of study.

11. The supplementary books, and course of study should be geared to one another with respect to content, philosophy, and organization.

12. The text may be well accompanied by thought-provoking problems and activities that will stimulate study by the reader.

13. The text should include a usable index and table of contents.

14. There should be a glossary of science terms with clearly stated explanation of meaning.

15. The text materials should help pupils reach objectives set up for the study of science.

16. The identification of concepts are shown in varied ways and broken down into elements and the elements arranged from the simple to the complex, so that the structure of a discipline is acquired by the pupils.

CHAPTER II

PRESENTATION AND ANALYSIS OF DATA

Prefatory Statement

The organization, presentation and analysis of the data pertinent to this research have been organized as follows: (a) the introduction which presents the overall frame-of-reference for the study; (b) the organization and treatment of data; (c) the presentation, analysis, and interpretation of the data derived from the study, and (d) the identification and organization of the materials.

Introduction

The surging front of science in this space age is having a great influence on what is happening in the classrooms. Man-made satellites, space travel, atomic science, and astronomy are contributing new content and interest to the curriculum. Researchers and teachers are discovering that many children can think more abstractly; can learn more advanced science in a more advanced way than was thought possible before. New conceptions of content are influencing the design of a great variety of new textbooks. No matter how much use we make of firsthand experiences in learning science, children must still learn a great deal from textbooks, supplementary books, and other printed material.

The task of selecting commercial instructional material is a

responsibility and a necessity confronting every classroom teacher who is to be competent and effective in his teaching endeavors. The vast number of publishers, each proclaiming to offer a sound effective planned series of textbooks, impels teachers to give published materials a realistic examination in light of the achievement status and instructional purposes in his given teaching situation. It is widely assumed that textbooks for instructional have been refined and that publishers are building the contents of these texts upon existing available research in the subject areas. To adhere to such assumptions is sound only if teachers are able to substantiate this premise by weighing the contents of textbooks through careful and extensive analysis.

The problem of book selection in science is very much alike the problem of book selection in any other field. Probably it needs more attention than it now receives. This concern for textbooks is not to imply that the textbook is to become the curriculum within itself. The concern does focus upon the importance of choosing the most appropriate available text for satisfying planned instructional objectives as one vital facet of the total curriculum. A modern concept of effective teaching is characterized by the classroom teacher's knowledge of the instructional materials used in his daily teaching.

It is against this background of concern and challenge that teachers must strive to provide the educational experiences which effectively prepare pupils for human conditions which exist today and which are anticipated for the future.

Organization and Treatment of Data

This chapter analyzes and compares data pertinent to the purposes of this study. It analyzes and identifies those concepts and elements thought by authorities to be necessary for the attainment of competency in science. A comparison of textbooks to determine which exhibit those elements deemed necessary. Included in this chapter is also a discussion describing the physical make-up of each book. This particular section of the research report presents the data on the organization and manner of treatment of the data revealed by the content analysis of the seven science textbooks.

The checklist used to gather data was designed to meet the requirements or criteria of authorities in the field deemed necessary for effective science textbooks. Three categories were used in the checklist in order to indicate the degree of emphasis in physical features. These categories were "Adequate," "Partially," and "Not at All."

Adequate or 1	highest in rank	(The feature was thought to be very apparent or obviously emphasized in the textbook)
Partially or 2	second in rank	(The feature was less apparently emphasized in the textbook)
Not At All or 3	third in rank	(The feature was not included at all)

Each textbook was examined, using the checklist as criterion and guide in determining the extent of the physical features.

Each textbook was examined and the frequency of the use of the eleven concepts selected from the major concepts was computed for each.

The concepts selected from the major areas were as follows: Living Matter, Rocks, Soils and Minerals, Air and Water, Universe and Solar System, Electricity and Magnetism, Heat, Light, Sound, Some properties Structures and Changes in Matter, Health and Safety, and Man's Use and Control.

The seven selected science textbooks for this study were secured from the Fulton County Textbook Department. These science textbooks were the ones that were used in the Fulton County System on fourth grade level during the year, 1966-67, and approved by the adopted list of the state of Georgia.

To fulfill the purposes of the projected content analysis, the books were examined and analyzed in terms of:

(a) Major concepts emphasized

(b) Type of activities or experiments

(c) Physical makeup

(d) The extent to which the concepts, activities or experiments provide opportunities for experimentation of children's interest and experiences.

For comparison each concepts will be assigned an alphabet and will retain this listing throughout the study.

The concepts were selected from the major areas from Science for Georgia Schools - Volume 3, formulated and stated to cover the major areas of science instruction for fourth grade pupils by the writer. The analysis of the textbooks in terms of the concepts required a review of all the areas. Every phase of the animate,inanimate and the extraterrestrial world is characterized by changes which occur in matter and energy. To live effectively in the world, one must understand

and use these principles of change. Much truth remains to be discovered and new discoveries may be accelerated when science education is general and sequential for all students, and when it stresses competence in the use of scientific methods of problem solving and the scientific attitudes.

The accepted eleven concept-areas of science instruction incorporated in the checklist design were used to analyze the content of each of the seven selected science textbooks.

Securing the textbooks, analyzing the concepts found in each, summarizing the concepts found, comparing such contents, constructing a checklist for physical features make up the fundamental steps necessary for gathering the data for this study.

The findings provided a general description of each book in terms of concepts included: percentage of page coverage, number of illustrations number of experiments or activities, words, follow-ups and pictures. These percentages and numbers were secured from the actual examination of each book. The percentage of each element was found by dividing the total number of pages of the book into the number of pages devoted to the concept.

The seven selected science textbooks are as follows:

Title of Books	Authors	Copy-right	Publishers
Probing Into Science	Willard J. Jacobson Cecelia J. Lauby Richard D. Konicek	1965	American Book Co.

Title of Books	Authors	Copy-right	Publishers
Concepts in Science	Paul F. Brandwein Elizabeth K. Cooper Paul E. Blackwood Elizabeth B. Hone	1966	Harcourt-Brace and World
Todays Basic Science	John G. Navarra Joseph Zafferoni	1963	Harper & Row
Science in Your Life	Herman Schneider Nina Schneider	1965	D. C. Heath
Science for Tomorrow's World	J. Darrell Barnard Cecelia Stendler James B. Bailey Wilbur L. Beauchamp	1966	Macmillan
Science is Experimenting	Glen Blough J. Stanley Marshall James B. Bailey Wilbur L. Beauchamp	1965	Scott-Foresman
Science	George G. Mallinson Jacqueline B. Mallinson John E. Steinberg Clarence R. Texler	1965	Silver Burdett

Content Analysis of the Seven Science Textbooks

This section of the research presents the data on the content analysis of the seven selected science textbooks examined as these data are indicated in Tables 1 through 19.

Probing into Science

The data on the treatment of the eleven basic concept-areas in elementary science in the fourty-grade textbook - Probing into Science are presented in Table 1, page 27.

TABLE 1

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH-GRADE TEXTBOOK: PROBING INTO SCIENCE

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	48	19.51	12	6	20	15	27
B. Rocks, soils, and mineral are important natural resources.	X	31	12.60	11	11	19	9	17
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	44	17.89	3	13	14	14	22
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.	X	11	4.47	4	8	10	6	14
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.	X	37	15.04	3	4	26	4	10
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	10	4.07	3	3	12	1	18
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	20	8.13	7	2	24	2	12
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	16	6.50	4	5	12	5	16
I. Sound travels through solids, liquids, and gases at different rates.	X	3	1.22	2	3	3	2	12
J. Man is concerned about protection against and the control of disease producing organism.								
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	26	10.57	9	6	3	5	28
Totals	10	246	100.00	58	61	145	63	176

The data in Table 1 revealed that the text contained 246 pages, 58 illustrations, 61 experiments or activities, 145 new words, 63 follow-ups and 176 pictures.

More specifically, the data in Table 1 revealed that concepts A, C, and E, received the greatest attention in this book with the number of pages devoted to them as follows: 48 or 19.51 per cent, 44 or 17.89 per cent, and 37 or 15.04 per cent, respectively. Concepts D, F, and I received least attention in this book with the number of pages devoted to them as follows: 11 or 4.47 per cent, 10 or 4.07 per cent, and 3 or 1.22 per cent, respectively.

Further, Table 1 revealed that the number of pictures and the number of new words received the greatest attention in this book with 176 and 145, respectively. The number of illustrations, the number of activities or experiments and the number of follow-ups received least attention with 56, 61, and 63, respectively.

Concepts In Science

The data on the treatment of the eleven basic concepts-areas in elementary science in the fourth grade textbook Concepts in Science are presented in Table 2, page 29.

The data in Table 2 revealed that the text contained 278 pages, 190 illustrations, 47 experiments or activities, 98 new words, 52 follow-ups and 232 pictures.

More specifically, the data in Table 2 revealed that concepts B, A, and G, received the greatest attention in this book with the number of pages devoted to them as follows: 49 or 16.63 per cent, 45 or 16.18

TABLE 2

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH-GRADE TEXTBOOK: CONCEPTS IN SCIENCE

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illus-trations	Number of Experi-ments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have loved together on earth for a long time and depend on each other.	X	45	16.18	32	4	12	12	37
B. Rocks, soil, and mineral are important natural resources.	X	49	16.83	27	7	14	7	38
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	37	13.31	20	9	16	6	39
D. The source of all food is directly or indirectly from water; the soil and carbon dioxide from the air.								
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.								
F. Electrical devices are very useful, however they can be very dangerous when proper safety pre-cautions are not taken.								
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	43	15.47	23	6	20	8	21
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	35	12.59	41	4	9	5	44
I. Sound travels through solids, liquids, and gases at different rates.	X	40	14.39	27	10	14	8	33
J. Man is concerned about protection against and the control of disease producing organism.								
K. Man has learned how to utilize his many natural resources and the various forms of energy for his benefit and comfort.	X	29	10.43	20	7	13	6	20
Totals	7	278	100.00	190	47	98	52	232

per cent or 43 or 15.47 per cent, respectively. Concepts C, H, and K received least attention in this book with number of pages devoted to them as follows: 37 or 13.31 per cent, 35 or 12.59 per cent and 29 or 10.43 per cent, respectively.

Further, Table 2 revealed that the number of pictures and the number of illustrations received the greatest attention in this book with 232 and 190, respectively. The number of new words, the number of activities or experiments and the number of follow-ups received least attention with 98, 47 and 52, respectively.

Today's Basic Science

The data on the treatment of the eleven basic concept-areas in elementary science in the fourth grade textbook Today's Basic Science are presented in Table 3, page 31.

The data in Table 3 revealed that the text contained 248 pages, 137 illustrations. 67 experiments or activities, 167 new words, 36 follow-ups and 211 pictures.

More specifically, the data in Table 3 revealed that concepts D, B, and G, received the greatest attention in this book with the number of pages devoted to them as follows: 49 or 19.76 per cent, 32 or 12.90 per cent or 30 or 12.09 per cent, respectively. Concepts A, J, and E, received least attention in this book with number of pages devoted to them as follows: 20 or 8.07 per cent, 20 or 8.07 per cent and 21 or 8.46 per cent, respectively.

Further, Table 3 revealed that the number of pictures, the number of new words and the number of illustrations received the greatest attention

TABLE 3

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH-GRADE TEXTBOOK: TODAY'S BASIC SCIENCE

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	20	8.07	1	7	25	1	32
B. Rocks, soil, and mineral are important natural resources.	X	32	12.90	6	10	11	6	14
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	49	19.76	26	10	14	1	28
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.	X	23	9.27	21	8	9	2	30
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.	X	21	8.46	11	6	36	4	12
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	24	9.69	13	7	16	3	14
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	30	12.09	14	7	21	4	29
H. Light is a form of energy which can be changed to other forms and its speed is measurable.								
I. Sound travels through solids, liquids, and gases at different rates.								
J. Man is concerned about protection against and the control of disease producing organism.	X	20	8.07	17	4	17	7	25
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	29	11.69	28	8	18	18	27
Totals	9	248	100.00	187	67	167	36	211

in this book with 211, 167, and 137, respectively. The number of activities or experiments and the number of follow-ups received least attention with 67 and 36, respectively.

Science In Your Life

The data on the treatment of eleven basic concept-areas in elementary school science in fourth grade textbook - Science in Your Life are presented in Table 4, page 33.

The data in Table 4 revealed that the text contained 297 pages, 97 illustrations, 52 experiments or activities, 123 new words, 34 follow-ups and 264 pictures.

More specifically, the data in Table 4 revealed that concepts A, F, and J, received the greatest attention in this book with the number of pages devoted to them as follows: 65 or 21.89 per cent, 38 or 12.79 per cent or 37 or 12.46 per cent, respectively. Concepts E, D, and H received least attention in this book with the number of pages devoted to them as follows: 27 or 9.09 per cent, 20 or 6.74 per cent and 10 or 3.36 per cent, respectively.

Further, Table 4 revealed that the number of pictures and the number of new words received the greatest attention in this book with 264 and 123 respectively. The number of illustrations, the number of activities or experiments and the number of follow-ups received least attention with 99, 52 and 34, respectively.

Science For Tomorrow's World

The data on the treatment of the eleven basic concept-areas in elementary school science in the fourth grade textbook -Science for

TABLE 4

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH GRADE TEXTBOOK: SCIENCE IN YOUR LIFE

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	65	21.89	20	9	15	2	42
B. Rocks, soils, and minerals are important natural resources.								
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	36	12.12	9	3	25	6	30
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from air.	X	20	6.74	5	4	10	6	39
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.	X	27	9.09	14	5	19	4	30
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	38	12.79	10	8	11	3	16
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	36	12.12	12	9	3	2	32
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	10	3.36	3	3	17	4	9
I. Sound travels through solids, liquids and gases at different rates.								
J. Man is concerned about protection against the control of disease producing organism.	X	37	12.46	12	5	13	4	30
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	28	9.43	14	6	10	3	36
Totals	9	297	100.00	99	52	123	34	264

Tomorrow's World are presented in Table 5, page 35.

The data in Table 5 revealed that the text contained 327 pages, 181 illustrations, 43 experiments or activities, 168 new words, 23 follow-ups and 273 pictures.

More specifically, the data in Table 5 revealed that concepts F, D, and A, received the greatest attention in this book with the number of pages devoted to them as follows: 60 or 18.35 per cent, 54 or 16.51 per cent or 54 or 16.51 per cent, respectively. Concepts I, C, and H received least attention in this book with number of pages devoted to them as follows: 16 or 4.89 per cent, 11 or 3.36 per cent and 4 or 1.22 per cent, respectively.

Further, Table 5 revealed that the number of pictures, number of illustrations and the number of new words received the greatest attention in this book with 273, 181, and 168 respectively. The number of activities or experiments and the number of follow-ups received least attention with 43 and 23, respectively.

Science Is Experimenting

The data on the treatment of the eleven basic concept-areas of elementary school science in fourth grade textbook - Science Is Experimenting are presented in Table 6, page 36.

The data in Table 6 revealed that the text contained 222 pages, 281 illustrations, 38 experiments or activities, 206 new words, 52 follow-ups and 289 pictures.

More specifically, the data in Table 6 revealed that concepts C, A, and K, received the greatest attention in this book with the number

TABLE 5

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH GRADE TEXTBOOK: SCIENCE FOR TOMORROW'S WORLD

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	54	16.51	48	11	24	2	63
B. Rocks, soils, and minerals are important natural resources.	X	20	6.12	2	1	12	4	17
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	11	3.36	6	5	12	2	16
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.	X	54	16.51	4	4	24	1	47
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.								
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	60	18.35	42	5	24	3	20
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	17	5.20	17	1	12	2	16
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	4	1.22	6	3	12	3	13
I. Sound travels through solids, liquids, and gases at different rates.	X	49	14.99	19	5	24	3	38
J. Man is concerned about protection against and the control of disease producing organism.	X	16	4.89	10	4	12	1	18
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	42	12.85	27	4	12	2	25
Totals	10	327	100.00	181	43	168	23	273

TABLE 6

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH GRADE TEXTBOOK: SCIENCE IS EXPERIMENTING

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	33	14.87	50	3	21	11	50
B. Rocks, soils, and minerals are important natural resources.	X	24	10.81	36	4	15	4	36
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	36	16.22	18	4	36	6	18
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.	X	8	3.60	8	5	10	5	16
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.								
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	10	4.51	17	5	23	4	17
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	20	9.01	51	11	19	5	51
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	6	2.70	9	2	9	1	9
I. Sound travels through solids, liquids, and gases at different rates.	X	28	12.61	21	4	32	5	21
J. Man is concerned about protection against and the control of disease producing organism.	X	28	12.61	33	0	20	9	33
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	29	13.06	38	0	21	2	38
Totals	10	222	100.00	281	38	206	52	289

of pages devoted to them as follows: 36 or 16.22 per cent, 33 or 14.87 per cent or 29 or 13.06 per cent, respectively. Concepts G, D, and H received least attention in this book with number of pages devoted to them as follows: 10 or 4.51 per cent, 8 or 3.60 per cent and 6 or 2.70 per cent, respectively.

Further, Table 6 revealed the number of illustrations, the number of pictures and the number of new words received the greatest attention in this book with 289, 281, and 206, respectively. The number of activities or experiments and the number of follow-ups received least attention with 38 and 52, respectively.

Science

The data on the treatment of the eleven basic concept-areas in elementary school science in fourth grade textbook - Science are presented in Table 7, page 38.

The data in Table 7 revealed that the text contained 226 pages, 209 illustrations, 74 experiments or activities, 109 new words, 78 follow-ups and 209 pictures.

More specifically, the data in Table 7 revealed that concepts A, B, and K, received the greatest attention in this book with the number of pages devoted to them as follows: 53 or 23.45 per cent, 28 or 12.39 per cent or 27 or 11.95 per cent, respectively. Concepts F, C, and H received least attention in this book with number of pages devoted to them as follows: 20 or 8.85 per cent, 18 or 7.97 per cent and 16 or 7.08 per cent, respectively.

Further, Table 7 revealed that the number of pictures, the number of illustrations and the number of new words received the greatest

TABLE 7

DISTRIBUTION OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE FOURTH GRADE TEXTBOOK: SCIENCE

Concepts	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures
A. Plants and animals have lived together on earth for a long time and depend on each other.	X	53	23.45	17	7	18	10	17
B. Rocks, soils, and minerals are important natural resources.	X	28	12.39	28	10	6	6	28
C. Water is vital to living things and is a source of electrical and mechanical energy.	X	18	7.97	25	8	9	8	25
D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.	X	22	9.73	17	10	14	10	17
E. Units of time for the earth and its satellites are caused by their rotation and revolutions.								
F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.	X	20	8.85	38	10	9	6	38
G. Oxidation and the changes of phase in matter are accomplished by heat energy.	X	22	9.73	19	7	12	12	19
H. Light is a form of energy which can be changed to other forms and its speed is measurable.	X	16	7.08	20	6	11	8	20
I. Sound travels through solids, liquids, and gases at different rates.								
J. Man is concerned about protection against and the control of disease producing organism.	X	20	8.85	19	6	13	10	19
K. Man has learned how to utilize his many natural resources and various forms of energy for his benefit and comfort.	X	27	11.95	26	10	17	8	26
Totals	9	226	100.00	209	74	109	78	209

attention in this book with 209, 209, and 109, respectively. The number of activities and experiments and the number of follow-ups received least attention with 74 and 78, respectively.

Comparative Analysis of the Seven Textbooks

Table 8, page 40, presents the comparative data on the treatment of the eleven basic concept-areas in science for the fourth grade as found in the seven science textbooks examined and analyzed.

The data in Table 8 revealed that the seven texts as a group contained 1844 pages, 1155 illustrations, 382 experiments or activities, 1016 new words, 338 follow-ups and 1654 pictures.

More specifically, the data in Table 8 revealed that Book V - Science for Tomorrow's Work, Book IV - Science in Your Life and Book II - Concepts in Science, provided the fuller treatment of the concepts, with 327 or 17.73 per cent, 297 or 16.17 per cent, and 278 or 15.05 per cent of the pages, respectively, devoted to the concepts. The rank-order of the treatment of the other four books was as follows: Book III - Today's Basic Science, 248 or 13.46 per cent, Book I - Probing Into Science, 246 or 13.34 per cent, Book VII - Science, 226 or 12.25 per cent, and Book VI - Science is Experimenting, 222 or 12.04 per cent of the pages, respectively.

Comparison of the Treatment of Each of the Eleven Concepts on the Seven Respective Textbooks

Table 9 through 19 present a comparison of the treatment of the concepts in the selected text. The books will be given Roman numerals and the concepts will be referred to in an alphabetical listing. The

TABLE 8

SUMMARY OF THE EVALUATIONS ON THE ELEVEN CONCEPT-AREAS TREATED IN THE SEVEN SCIENCE TEXTBOOKS APPROVED FOR THE FOURTH GRADES OF FULTON COUNTY SCHOOLS 1966-1967

Books	Concepts Included	Concepts Not Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-Ups	Number of Pictures	Glossary	Dictionary mof Scientists
I Probing Into Science	10	1	246	13.34	58	61	145	63	176	1	0
II Concepts in Science	7	4	278	15.07	190	47	98	52	232	1	0
III Today's Basic Science	9	2	248	13.46	137	67	167	36	211	1	0
IV Science in Your Life	9	2	297	16.10	99	52	123	34	264	1	0
V Science For Tomorrow's World	10	1	327	17.73	181	43	168	23	273	1	1
VI Science is Experimenting	10	1	222	12.04	281	38	206	52	289	1	0
VII Science	9	2	226	12.26	209	74	109	78	209	1	0
Totals	64	13	1844	100.00	1155	382	1016	338	644	7	1

concepts and books will be treated for concepts included, percentage of concepts included, number of pages, number of illustrations, number of experiments or activities, number of new words, number of follow-ups and number of pictures.

The concepts are:

A. Plants and animals have lived together on earth for a long time and depend on each other.

B. Rocks, soils, and minerals are important natural resources.

C. Water is vital to living things and is a source of electrical and mechanical energy.

D. The source of all foods is directly or indirectly from water; the soil and carbon dioxide from the air.

E. Units of time for the earth and its satellites are caused by their rotation and revolutions.

F. Electrical devices are very useful, however they can be very dangerous when proper safety precautions are not taken.

G. Oxidation and the changes of phase in matter are accomplished by heat energy.

H. Light is a form of energy which can be changed to other forms and its speed is measurable.

I. Sound travels through solids, liquids, and gases at different rates.

J. Man is concerned about protection against and the control of disease producing organism.

K. Man has learned how to utilize his many natural resources and the various forms of energy for his benefit and confort.

Comparison of Textbooks on Concept A

The comparison of the data on the treatment of Concept "A" in the seven selected science textbooks as presented in Table 9, page 42.

TABLE 9

DISTRIBUTION AND COMPARISON OF CONCEPT "A" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	48	19.51	12	6	20	15	27
II	Concepts In Science	X	45	16.18	32	4	12	12	37
III	Today's Basic Science	X	20	8.07	1	7	25	1	32
IV	Science In Your Life	X	65	21.89	20	9	15	2	42
V	Science For Tomorrow's World	X	54	16.51	48	11	24	2	63
VI	Science Is Experimenting	X	33	14.87	50	3	21	11	50
VII	Science	X	53	23.45	17	7	18	10	17

The number of pages ranged from a low of 20 or 8.07 per cent in Book III to a high of 65 or 21.89 per cent in Book IV. The number of illustrations ranged from a low of 1 in Book III to a high of 50 on Book VI. The experiments ranged from a low of 3 in Book VI to a high of 11 in Book V. New words ranged from a low of 12 in Book II to a high of 25 in Book III. The follow-up activities ranged from a low of 1 in Book III to a high of 15 in Book I. Pictures ranged from a low of 17 in Book VII to a high of 63 in Book V.

Comparison of Textbooks on Concept B

The comparison of data tabulated for Concept "B" from the seven selected fourth grade science textbook as presented in Table 10, page 44, is analyzed below.

The number of pages ranged from a low of 20 or 6.74 per cent in Book V to a high of 65 or 21.89 per cent in Book IV. The number of illustrations ranged from a low of 2 in Book V to a high of 36 in Book VI. The experiments ranged from a low of 0 in Book IV to a high of 11 in Book I. New words ranged from a low of 0 in Book IV to a high of 19 in Book I. The follow-up activities ranged from a low of 0 in Book IV to a high of 9 in Book I. Pictures ranged from a low of 0 in Book IV to a high of 38 in Book II.

Comparison of Textbooks on Concept C

The comparison of data tabulated for Concept "B" from the seven selected fourth grade science textbooks as presented in Table 11, page 45, is analyzed below.

TABLE 10

DISTRIBUTION AND COMPARISON OF CONCEPT "B" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	31	12.60	11	11	19	9	17
II	Concepts In Science	X	49	16.63	27	7	14	7	38
III	Today's Basic Science	X	32	12.90	6	10	11	6	14
IV	Science In Your Life								
V	Science For Tomorrow's World	X	20	6.74	2	1	12	4	17
VI	Science Is Experimenting	X	24	10.81	36	4	15	4	36
VII	Science	X	28	12.39	28	10	6	6	28

TABLE 11

DISTRIBUTION AND COMPARISON OF CONCEPT "C" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	44	17.89	3	13	14	14	22
II	Concepts in Science	X	37	13.31	20	9	16	6	39
III	Today's Basic Science	X	49	19.76	26	10	14	1	28
IV	Science In Your Life	X	36	12.12	12	9	3	2	32
V	Science For Tomorrow's World	X	11	3.36	6	5	12	2	16
VI	Science Is Experimenting	X	36	16.22	18	4	36	6	18
VII	Science	X	18	7.97	25	8	9	8	25

The number of pages ranged from a low of 11 or 3.36 per cent in Book V to a high of 49 or 19.76 per cent in Book III. The number of illustrations ranged from a low of 3 in Book I to a high of 26 in Book III. The experiments ranged from a low of 4 in Book VI to a high of 13 in Book I. New words ranged from a low of 3 in Book IV to a high of 36 in Book VI. The follow-ups activities ranged from a low of 1 in Book III to a high of 14 in Book I. Pictures ranged from a low of 16 in Book I to a high of 39 in Book II.

Comparison of Textbooks in Concept D

The comparison of the data tabulated for concept "D" from the seven selected science textbooks as presented in Table 12, page 47, is analyzed below.

The number of pages ranged from a low of 0 or 0.0 per cent in Book II to a high of 54 or 16.51 per cent in Book V. The number of illustrations ranged from a low of 0 in Book II to a high of 21 in Book III. The experiments ranged from a low of 0 in Book II to a high of 10 in Book VI. New words ranged from a low of 0 in Book II to a high of 24 in Book V. The follow-up activities ranged from a low of 0 in Book II to a high of 10 in Book VII. Pictures ranged from a low of 0 in Book II to a high of 39 in Book IV.

Comparison of Textbooks on Concept E

The comparison of the data tabulated for Concept "E" from the seven selected science textbooks as presented in Table 13, page 48, is analyzed below.

TABLE 12

DISTRIBUTION AND COMPARISON OF CONCEPT "D" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	11	4.47	4	8	10	6	14
II	Concepts In Science								
III	Today's Basic Science	X	23	9.27	21	8	9	2	30
IV	Science In Your Life	X	20	6.74	5	4	10	6	39
V	Science For Tomorrow's World	X	54	16.51	4	4	24	1	28
VI	Science Is Experimenting	X	8	3.60	8	5	10	5	16
VII	Science	X	22	9.73	17	10	14	10	17

TABLE 13

DISTRIBUTION AND COMPARISON OF CONCEPT "E" FOR THE SEVEN SELECTED TEXTS

Books	Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I Probing Into Science	X	37	15.04	3	4	26	4	10
II Concepts In Science								
III Today's Basic Science	X	21	8.46	11	6	36	4	12
IV Science In Your Life	X	27	9.09	14	5	19	4	30
V Science For Tomorrow's World								
VI Science Is Experimenting								
VII Science								

The number of pages ranged from a low of 0 or 0.0 per cent in Books II, V, VI, and VII to a high of 37 or 15.04 per cent in Book I. The number of illustrations ranged from a low of 0 in Books II, V, VI, and VII to a high of 14 in Book IV. The experiments ranged from a low of 0 in Books II, V, VI, and VII to a high of 6 in Book III. New words ranged from a low of 0 in Books V, II and VII to a high of 36 in Book III. The follow-up activities ranged from a low of 0 in Books I, V, VI, and VII to a high of 4 in Books I, III, and IV. Pictures ranged from a low of 0 in Books II, V, VI, and VII to a high of 30 in Book IV.

Comparison of Textbooks on Concept F

The comparison of the data tabulated for Concept "F" from the seven selected science textbooks as presented in Table 14, page 50, is analyzed below.

The number ranged from a low of 0 or 0.0 per cent in Book II to a high of 60 or 18.35 per cent in Book V. The number of illustrations ranged from a low of 0 in Book II to a high of 42 in Book V. The experiments ranged from a low of 0 in Book II to a high of 10 in Book VII. New words ranged from a low of 0 in Book II to a high of 24 in Book V. The follow-up activities ranged from a low of 0 in Book II to a high of 6 in Book VII. Pictures ranged from a low of 0 in Book II to a high of 38 in Book VII.

Comparison of Textbooks on Concept G

The comparison of the data tabulated for Concept "G" from the seven selected textbooks for fourth grade science as presented in Table 15,

TABLE 14

DISTRIBUTION AND COMPARISON OF CONCEPT "F" FPR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	10	4.07	3	3	12	1	18
II	Concepts In Science								
III	Today's Basic Science	X	24	9.69	13	7	16	3	14
IV	Science in Your Life	X	38	12.79	10	8	11	3	16
V	Science For Tomorrow's World	X	60	18.35	42	5	24	3	20
VI	Science Is Experimenting	X	10	4.51	17	5	23	4	17
VII	Science	X	20	8.85	38	10	9	6	38

page 52, is analyzed below.

The number of pages ranged from a low of 20 or 8.13 per cent in Book I to a high of 43 or 15.47 per cent in Book II. The number of illustrations ranged from a low of 7 in Book I to a high of 51 in Book VI. The experiments ranged from a low of 1 in Book V to a high of 11 in Book VI. New words ranged from a low of 3 in Book IV to a high of 24 in Book I. The follow-up activities ranged from a low of 2 in Book IV to a high of 12 in Book VII. Pictures ranged from a low of 12 in Book I to a high of 51 in Book VI.

Comparison of Textbooks on Concept H

The comparison of the data tabulated for Concept "H" from the seven selected fourth grade textbooks as presented in Table 16, page 53, is analyzed below.

The number of pages ranged from a low of 0 or 0.0 per cent to a high of 35 or 12.59 per cent in Book II. The number of illustrations ranged from a low of 0 in Book III to a high of 41 in Book II. The experiments ranged from a low of 0 in Book III to a high of 6 in Book VII. New words ranged from a low of 0 in Book III to a high of 17 in Book IV. The follow-up activities ranged from a low of 0 in Book III to a high of 8 in Book VII. Pictures ranged from a low of 0 in Book III to a high of 44 in Book II.

Comparison of Textbooks on Concept I

The comparison of the data tabulated for Concept "I" from the seven selected textbooks for fourth grade science as presented in Table 17, page 54, is analyzed below.

TABLE 15

DISTRIBUTION AND COMPARISON OF CONCEPT "G" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	20	8.13	7	2	24	2	12
II	Concepts In Science	X	43	15.47	23	6	20	8	21
III	Today's Basic Science	X	30	12.09	14	7	21	4	29
IV	Science In Your Life	X	36	12.12	12	9	3	2	32
V	Science For Tomorrow's World	X	17	5.20	17	1	12	2	16
VI	Science Is Experimenting	X	20	9.01	51	11	19	5	51
VII	Science	X	22	9.73	19	7	12	12	19

TABLE 16

DISTRIBUTION AND COMPARISON OF CONCEPT "H" FOR THE SEVEN SELECTED TEXTS

Books		Concept Included	Number of Pages	Per Cent	Number of Implications	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	16	6.50	4	5	12	5	16
II	Concepts In Science	X	35	12.59	41	4	9	5	44
III	Today's Basic Science								
IV	Science In Your Life	X	10	3.36	3	3	17	4	9
V	Science For Tomorrow's World	X	4	1.22	6	3	12	3	13
VI	Science Is Experimenting	X	6	2.70	9	2	9	1	9
VII	Science	X	16	7.08	20	6	11	8	20

TABLE 17

DISTRIBUTION AND COMPARISON OF CONCEPT "I" FOR THE SEVEN SELECTED TEXTS

Books		Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	3	1.22	2	3	3	2	12
II	Concepts in Science	X	40	14.39	27	10	14	8	33
III	Today's Basic Science								
IV	Science In Your Life	X	37	12.46	12	5	13	4	30
V	Science For Tomorrow's World	X	49	14.99	19	5	24	3	38
VI	Science Is Experimenting	X	28	12.61	21	4	32	5	21
VII	Science								

The number of pages ranged from a low of 0 or 0.0 per cent in Book III to a high of 49 or 14.99 per cent in Book V. The number of illustrations ranged from a low of 0 in Books III and VII to a high of 27 in Book II. The experiments ranged from a low of 0 in Books III and VII to a high of 10 in Book II. New words ranged from a low of 0 in Books III and VII to a high of 32 in Book VI. The follow-up activities ranged from a low of 0 in Books III and VII to a high of 8 in Book II. Pictures ranged from a low of 0 in Books III and VII to a high of 38 in Book V.

Comparison of Textbooks in Concept J

The comparison of the data tabulated for Concept "J" from the seven selected fourth grade science textbooks as presented in Table 18, page 56, is analyzed below.

The number of pages ranged from a low of 0 or 0.0 per cent in Books I and II to a high of 37 or 12.46 per cent in Book IV. The number of illustrations ranged from a low of 0 in Books I, and II to a high of 33 in Book VI. The experiments ranged from a low of 0 in Books I and II to a high of 6 in Book VII. New words ranged from a low of 0 in Books I and II to a high of 20 in Book VI. The follow-up activities ranged from a low of 0 in Books I and II to a high of 10 in Book VII. Pictures ranged from a low of 0 in Books I and II to a high of 33 in Book VI.

Comparison of Textbooks on Concept K

The comparison of the data tabulated for Concept "K" from the seven selected fourth grade science textbooks as presented in Table 19,

TABLE 18

DISTRIBUTION AND COMPARISON OF CONCEPT "J" FOR THE SEVEN SELECTED TEXTS

Books	Concepts Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I Probing Into Science								
II Concepts In Science								
III Today's Basic Science	X	20	8.07	17	4	17	7	25
IV Science In Your Life	X	37	12.46	12	5	13	4	30
V Science For Tomorrow's World	X	16	4.89	10	4	12	1	18
VI Science Is Experimenting	X	28	12.61	33	0	20	9	33
VII Science	X	20	8.85	19	6	13	10	19

page 58, is analyzed below.

The number of pages ranged from a low of 26 or 10.5 per cent in Book I to a high of 42 or 12.85 per cent in Book V. The number of illustrations ranged from a low of 9 in Book I to a high of 38 in Book VI. The experiments ranged from a low of 0 in Book VI to a high of 10 in Book VII. New words ranged from a low of 1 in Book IV to a high of 21 in Book VI. The follow-up activities ranged from a low of 2 in Books V and VI to a high of 8 in Books III and VII. Pictures ranged from a low of 20 in Book II to a high of 38 in Book VI.

Identification and Organization of Material

In this section of the research report is presented general discussion of the physical characteristics and content material of each of the seven selected fourth grade science textbooks.

Probing Into Science (Jacobson, Lauby and Konicek) designed this text to stimulate children's interest in science, give them a better understanding of the environment in which they live, and show them how they can explore their environment in a scientific manner. This text helps children to answer many questions about energy, work, matter, chemical and physical changes. This text guides children into study of the solar system and of life in space. It helps them to "Find out" answers to many questions.

The text material is organized so that inquiries into science are resolved and a firm foundation for learning at sequential levels. On each page of the text are guiding questions to encourage the pupils to discover for themselves.

TABLE 19

DISTRIBUTION AND COMPARISON OF CONCEPT "K" FOR THE SEVEN SELECTED TEXTS

	Books	Concept Included	Number of Pages	Per Cent	Number of Illustrations	Number of Experiments or Activities	Number of New Words	Number of Follow-ups	Number of Pictures
I	Probing Into Science	X	26	10.57	9	6	3	5	28
II	Concepts In Science	X	29	10.43	20	7	13	6	20
III	Today's Basic Science	X	29	11.69	28	8	18	8	27
IV	Science In Your Life	X	28	9.43	14	6	1	3	36
V	Science For Tomorrow's World	X	42	12.85	27	4	12	2	25
VI	Science Is Experimenting	X	29	13.06	38	0	21	2	38
VII	Science	X	27	11.95	26	10	17	8	26

The text contains six units. Each unit presents one important area in the study of science. Each unit is introduced by a description of some important development in science.

Each unit is divided into sections, which are followed by "Find Out", one or more experiments by "Looking Back", a "review" of material just studied, and by "Questions To Think About", a challenge to investigate more than is presented within the section.

At the end of each unit a section called "Remember" summarizes the important learning of the unit. It is followed by one or more pages devoted to the science words within the unit and their uses. Then comes "Thinking Ahead in Science", a group of questions for which answers may be found in encyclopedia or other source books. Finally, "Things To Do" at the close of each unit suggests interesting research and activities to be done after the basic work of the unit is completed.

Science words are italicized and adequately defined. The readability of the text is in accord with grade placement. The Spache Readability Formula and the Dale Chall Formula were used as a measure of ease.

Concepts in Science (Brandwein, Cooper, Balckwood, and Hone)

This text is designed to stimulate children interest in science, give them a better understanding of the environment in which they live, and show them how they can explore their environment in a scientific manner.

Each lesson has three main divisions: The introduction - in which

a problem is raised and curiosity stimulated; that is, thought is linked to action. The main body of the lesson - the contents is organized for concept development and then summarized. The reinforcement or extension of the lesson - in which a variety of activities are introduced for enrichment.

The text is designed to create an atmosphere of discovery in concept development; to stimulate personal envolvement; to maintain sharp curiosity; and to lay a firm basis for intelligent actions and independent inquiry. The book is illustrated for visual interpretation of objects. The text has full color photographs, drawings, and investigations. In addition to the investigations that are found at strategic points within the sections, there are "open ended" investigations at the end of the sections as well as at the end of the units. The text feature cumulative concepts reviews and evaluations which enables pupils to test their understanding of a concept. Key words are introduced in bold face type and are repeated, with page references in the glossary using a pronunciation explanation.

Statements are used to provoke thinking on the part of the pupils so they may learn facts and principles. Introductory illustrations are used to encourage thinking and discussions.

Today's Basic Science (John Gabriel Navarra, Joseph Zafforini)

This book attempts to continue the scientific method, the development of a scientific attitude, the development of functional information and the development of instrumental skills. The text is an easy reader. Every lesson calls attention to important concepts and

generalizations. Each makes an effort to clarify principles and to encourage independent thinking upon the part of the pupil. This text takes the pupil to the laboratory. He sees the scientist at work. The pupil is able to assume the role of a scientist: he does experiments, observes, and then check his experiments. This book is structured to develop the child's scientific attitude and to search for advances.

Science in Your Life (Hermon and Nina Schneider)

This text is in an informal style that is simple and easy to read and has real appeal to young children. The vocabulary, sentence length and other readability factors have been carefully controlled in order that no reading difficulty may hinder the child's understanding of the text. Each of the following concepts is developed as it affects the lives of children: The Insect World, Plants, and Seeds, Molecules of Matter Causes of Weather, Climate and Living Things, Water and Living Things, Force and Moving Things, Machines and Power, and Earth Moon and Space. The experiences are organized so that the science concepts build one on another.

The experiments are easy enough for pupils to do without a lot of assistance. This book does not stress a lot of scientific apparatus but experiments that can be done with home-made equipment and the ideas from experiments can be applied to everyday living.

Three types of activities are found at the end of each unit. These activities provide opportunities for the pupils to summarize the facts learned and to relate the material in the unit to their own experiences

and environment. The section, "Things To Talk About" is designed to stimulate thinking or discussion. The section "Discuss and Find Out," provide additional activities that can be used as enrichment materials for faster moving children. The section "Do This and Find Out," is the research problem. The section "Find Out From Books," give the children research experiences in other books pertaining to same subject or objects being studied in science and an extension of the concepts found in the unit. The section "Books To Read", lists books for children on grade level - and books recommended for the slower child as well as the ones recommended for the average or faster gifted child. The purpose of this bibliography is to instill within the child the idea that even though his own textbooks have some information on a given topic there is much more to be found in the library.

Science For Tomorrow's World (Barnard, Stendler, Spock)

This text is set up with nine units as follows: "The Scientist's Way," "Understanding Energy," "Living Things - Green Plants," "Animals-Simple and Complex," Using Electricity, Sound - A Form of Energy, Light and Sight, Weather in Your Life, and "Safety."

Each unit in this book is organized to teach the key concepts of science. This text is built on ten key concepts of science. Throughout the text, specific concepts lead the pupils toward deeper understanding of these key concepts. The text contain many activities, experiments and illustrations that teach pupils to think and work, using the ways of the scientist.

The text provides numerous insights into the ways in which

think and work. This text teaches the pupils to work out problems by: Questions, Observing, Experimenting, Comparing, Inferring, Measuring, Selecting sources of information, Communicating, Explaining, and Hypothesizing or speculating. This text provides at the end of every major unit an abundance of open ended investigations, including experiments, observations, and demonstrations. This text gives the pupils a "behind the scenes knowledge" of traffic and fire safety.

A unique feature of the book is a dictionary of scientist that is used throughout the text and labeled as "Pathfinder in Science."

Science Is Experimenting (Blough, Marshall, Bailey, and Beauchamp)

This text is organized around a series of problem units. The units are focused on an understanding of some of the major aspects of six broad science areas. These areas are Energy and Its Tranformation; Matter and Its Changes; Earth and Its Relations; Man's Control of the Physical Environment; Structure, Life Processes; and Interrelationship of Living Things.

Each of the seven units is centered on a problem of natural interest to fourth grade children. These problems, together with the science area from which they were drawn, are as follows: How are Living Things Put in Groups? What Are the Materials Around Us Like? How Do We Use Magnets? How Does The Earth Surface Change? How Does Your Body Work? How Do We Use Heat and How Are Living Things Fitted to Live in Different Places?

Many interesting experiments and other activities bearing such labels as "What Do You Think?" Whats Wrong?," "Things to Do and/or

Experiment" and Check up," motivate the pupils to an energetic study of science problems.

Provided at the beginning of each unit is a detailed listing of all materials necessary for performing of all the experiments in the unit.

This text will stimulate interest because of its colorful pictures and illustrations. The interesting picture of the cover will encourage pupils and give more curiosity for science work.

Science (Mallinson, Mallinson, Stunberg and Trexler)

The presentation in this text is organized around the areas of physical science, biological science and earth science. The text introduces activities that require skills appropriate at the fourth grade level, such as: observing, reporting, comparing, classifying, analyzing, inferring, and predicting.

The text contains photographs giving pupils a chance at observing and comparing. There are questions to stimulate critical thinking and a glossary.

In this text the subject-matter content is divided into eight units. These units are: Man and the Living World, Using the Atmosphere, Water on the Earth, Managing the Earth's Resources, Magnetism and Electricity, Using Heat and Light, Understanding the Weather, and Caring for the Human Body.

The glossary carries words which are adequately defined. The readability of the text is in accord with grade placement.

Pictures, experiments and diagrams are used to increase the child's understanding of the concepts or principles.

Summary of General Characteristics of the Seven Selected Textbooks

The following summary is presented on the seven selected fourth grade science texts examined for the common aspects and special features.

With regards to common aspects which the texts were designed to meet among the needs, interest, and abilities of fourth grade pupils, the following are significant. They were organized in terms of chapter units. Each of the units was related to personal experiences and to science content. Each book is designed to create an atmosphere of discovery in concept development; to stimulate personal envolvement; to maintain sharp curiosity; and to lay a firm basis for intelligent action and independent inquiry. Each text contained an abundance of investigations to help develop the main concepts.

Each text presented science to the pupil in such a way that new facts and their relationship grow out of known facts in a natural logical developmental way. The text helps the pupil to learn how to "think like a scientist" by developing and using the techniques of science as he accumulates information.

Throughout each text, many open ended questions emphasize science as a process and encourage pupils to seek varied ways and alternate materials while seeking answers. The questions are so structured as to allow pupils to imagine, speculate, infer, and offer their own ideas.

The photographs and illustration actually promote inquire into the science process by virtue of the science materials and concepts represented in them, and by the science activities in which the children

and animals are engaged.

The texts provided with a vocabulary and a glossary. The index, also, serves the pupil well, as a reference aid and for reviews

CHAPTER III

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Recapitulation of Theoretical Basis of the Study

Introduction

The aim of an adequate science program is to stimulate children in a constantly growing understanding of the forces, phenomena, processes, materials, and living things that make up a large part of their everyday world.[1] As this understanding develops, science makes its contributions to general education.

Science in one sense is a body of information and principles that help us understand the world around us from atoms to stars, from microscopic water-life to man. In another sense, science may be regarded as methods of discovery - the method by which new information is uncovered, new principles arrived at, old principles modified or discarded.

In our considerations of the values of science in the elementary school we must understand the potentialities that the elementary school has as the school of all the people. We have in our classroom both tomorrow's laymen and tomorrow's scientists.

The goal of science education is to develop a scientific attitude,

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[1] June E. Lewis and Irene C. Potter, The Teaching of Science in Elementary School (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961), p. 8.

thinking abilities, and basic ideas that help children understand their world. The concepts or principles taught must be related to children's everyday life activities. They must be taught to the point so that children may actually use them in life situations. For a child to understand a concept fully he must be given opportunities to enrich and broaden it by applying it to various situations through personal experiences. He must be permitted to re-experience, in part, the process by which a scientist arrives at the understanding and then applies them on a broader basis.[1]

No matter how much we make use of first hand experiences in learning science, children must still learn a great deal from textbooks. In contrast to the limited opportunity for learning provided by a single textbook, the child learns from many textbooks.

Rationale

The problem for book selection in science is very much like the problem of book selection in any other field. Probably it needs more attention than it now receives. Obviously, some books serve our purpose better than others because they fulfill certain requirements. Books constitute an important source of learning in science as well as experiments and activities. The text material should be judged on the basis of its effectiveness in helping pupils to reach the objectives set up for the study of science.[2] The organization and development of the text

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[1] Lewis and Potter, op. cit., p. 9.

[2] Glenn O. Blough, Julius Schwartz, and A. J. Haggett, Elementary School Science and How To Teach It (New York: Dryden Press, 1951), p. 71.

should, furthermore, be in accordance with a philosophy of science education.[1]

The book should be attractive, of suitable size, and durable. The type and page format should make for readability and be pleasing to the eye. The paper should be of good quality. Pictures should help to teach as well as make the book more attractive. They should, by all means, be interesting and scientifically accurate. This research has been concerned with the types of textbooks that are available and the kind of physical and conceptual features that are presented to pupils.

Statement of the Problem

The problem involved in this study was to analyze seven selected science textbooks used in the Fulton County Schools in order to determine if these books met the standards set up by competent science authorities.

Purpose of the Study

The general design of the study was to focus upon the analyzation of seven selected fourth grade science textbooks for the following reasons:

1. To identify those concepts as outlined by competent science authorities thought to be necessary for the attainment of competency in science textbooks.
2. To determine the extent to which the concepts and elements were included in each textbook.

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[1] Blough and Swartz, op. cit., p. 17.

3. To make a comparison of the selected textbooks in order to determine the ones which exhibits the most of what authorities deem necessary for effectively constructed textbooks.

4. To describe selected science textbooks in terms of physical make-up.

Limitations of the Study

Limitations of this study were as follows:

1. The proposed study was limited to seven selected fourth grade science textbooks used in Fulton County Schools.

2. The checklist results was the selected data upon which the study will depend.

Definition of Terms

The following terms used in this study were defined as follows:

1. Concept - a network of inferences stemming from observation of objects and events, resulting in the selection of common elements, or like attributes, among the objects and events under observation.[1]

2. Analyze - to examine critically or minutely in order to determine the nature or form of the phenomena under investigation.

3. Science textbook - a book used as a basis of instruction for the study of natural, phenomena, describing and explaining them through laws and consequences subject to verification.

4. Content Analysis - is a research technique which deals with the systematic examination of communication content which uses both subjective qualitative appraisal and objective quantitive description.

Recapitulation of Research Design of Study

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[1]Paul F. Brandwein and Elizabeth K. Cooper, Concepts In Science (New York: Harcourt, Brace and World, 1966), p. 7.

The significant aspect of the research design of this study are characterized below:

1. Locale and Period of Study - The central locale of this study was the Trevor Arnett Library, Atlanta University, The Public Library, Atlanta, Georgia and the home of the writer, Atlanta, Georgia.

2. Method of Research - The Descriptive-Survey Method of research employing the specific techniques of Content Analysis and the checklist of the seven selected science textbooks were used to gather the data required for this research.

3. Materials/Instruments - The instruments used to collect the necessary data for the research were: (1) a checklist for recording the concepts found in each book, (2) a checklist for comparing the concept in all the books, and (3) a checklist for examining each book for physical make up.

4. Criterion of Reliability - The checklist used in this research was constructed from two sources: (1) the concepts were selected from the Suggested Principles for fourth grade science curriculum, as found in Science for Georgia Schools, Volume 3, and (2) items were taken from, "What To Look for in Choosing Textbooks" by Malcolm E. Mellott.

5. Procedural Steps - The procedural steps used to conduct this research were:
   a) The pertinent literature related to the study was surveyed, abstracted, summarized and incorporated in the thesis copy.
   b) The copies of textbooks to be analyzed were secured from educational publishing agencies.
   c) The criteria for examining the science textbook were examined and selected as dictated by the purposes of the study.
   d) A checklist for evaluating the science textbook were formulated.
   e) The content and style of the textbooks in terms of organization, scope and concepts were fully described.
   f) The data derived from the checklist instrument were organized into appropriate tables.
   g) The finding, recommendation, and implications as derived from the analysis were formulated and incorporated into the final thesis copy.

Summary of Related Literature

The related literature pertinent to this study was reviewed and

found to be summarized with the analysis of content and science concepts being identified. The pertinent literature may be summarized into the significant statements to follow:

1. Many studies have been done employing the content analysis technique.
2. The text must be accurate.
3. The text should be written in accordance with its purpose.
4. The organization and development of the text should, be in accordance with a philosophy of science education.
5. The text should introduce the concepts or generalizations of science education.
6. The text should be attractive, of suitable size and durable.
7. The type and page format should make for readability and pleasing to the eye.
8. The paper should be of good quality.
9. The style of writing should be understandable and interesting.
10. The text should fit into a general plan of a course of study.
11. The text supplementary books, and course of study should be geared to one another with respect to content, philosophy, and organization.
12. The text may be well accompanied by thought-provoking problems and activities that will stimulate further study by the reader.
13. The text should include a usable index and table of contents.
14. There should be a glossary of science terms with clearly stated explanation of meaning.
15. The text materials should help pupils reach objectives set up for the study of science.
16. The identification of concepts are shown in varied ways

and broken down into elements and the elements arranged from the simple to the complex, so that the structures of a discipline is acquired by the pupils.

Summary of Basic Findings

The findings of this research were summarized and are presented below. The more comprehensive data set forth in Chapter II.

1. The seven selected textbooks analyzed were found to have treated all eleven concepts in varying degrees, from seven to ten of the eleven concepts.

2. The number of pages that treated the eleven science concepts for which the study was concerned ranged from a low of 222 pages to a high of 327.

3. The number of illustrations used in the seven selected science textbooks ranged from a low of 58 pages in Book I to a high of 281 pages in Book VI.

4. The seven selected science books were found to use between 38 and 74 illustrations to expand children's interest.

5. The seven selected science texts presented a list of new words, up to ten in preparing the pupils for the study of a new concept or unit with a total of 98 to 208 words.

6. The seven selected science texts used from 23 to 78 follow ups to enhance pupils growth through first-hand experiences with science instruction.

7. The seven selected science textbooks used from 176 to 289 pictures to enhance the concepts, activities, illustrations, and follow-ups.

8. All of the selected science textbooks were published in the last five years.

9. There seemed to have been an agreement among the authors about the kind of information that should or should not be included in the textbooks.

10. That all of the authors agreed on the inclusion of Concepts A, and G, 6 included Concept B, 7 included Concept C, 6 included Concept D, 3 included Concept E, 6 included Concept F, 6 included Concept H, 4 included Concept I, 6 included Concept J, and 6 included Concept E.

Conclusions

The analysis and interpretation of the data used would seem to warrant the following conclusions:

1. That there was partial agreement on concepts found. All of the textbooks contained at least seven of the eleven concepts.

2. That most of the selected science textbooks contained an adequate number of experiments and activities.

3. That the rapid and continuous advance in science knowledge which tends to make present knowledge obsolete within three or five years; therefore, the more excellent science textbooks are written and published within the latest five-year period.

   a) All seven of the science textbooks examined had been written within the past five years.

4. That the texts tended to be in agreement with authorities on the inclusion of the universally accepted criteria-concepts of science as indicated by the following:

   a) All of the texts agreed on the inclusion of Concepts A and G
   b) Six agreed on Concept B
   c) Seven agreed on Concept C
   d) Six agreed on Concept D
   e) Three agreed on Concept E
   f) Six agreed on Concept F
   g) Six agreed on Concept H
   h) Four agreed on Concept I
   i) Six agreed on Concept J
   j) Five agreed on Concept K

   This indicates that the textbooks are in agreement with reputable authorities.

5. That the texts were in agreement with authorities on the inclusion of most of the physical features established for this analysis.

Implications

The writer feels that the research seem to justify the following

implications:

1. The author of the texts agreed upon most of the conceptual features established for this analysis.

2. Priority should be given to the textbook that provide the most attention to concept authorities deemed necessary for attainment in science.

3. That teachers should be aware of the concepts and physical feature agreed upon by authorities so that they might select for their own class, text which treat a greater number of conceptual features.

4. That analysis be made of science textbooks at every grade level.

5. That those persons in charge of selecting textbooks in science become aware of authoritative concepts and physical features.

Recommendations

The findings, conclusions, and implications which stemmed from this research should appear to warrant the following recommendations:

1. Teachers should be aware of the basic concepts agreed on by experts so that they might select their own class text which treat a greater number of the eleven fundamental concepts.

2. In-service sessions should be made available to acquaint teachers with the content of the science textbooks on fourth-grade level.

3. More studies of this type, but greater in scope, should be conducted in an effort to secure additional data to be used in selecting science textbooks for any grade level.

BIBLIOGRAPHY

Books

Blough, Glen O., Schwartz, Julius, and Huggett, A. J. Elementary School Science and How To Teach It. New York: Dryden Press, 1951.

Craig, George S. Science for the Elementary School Teacher. Boston: Ginn and Co., 1962.

Heiss, Eldood D., Odum, Ellsworth S., and Hofman, Charles W. Science Teaching. New York: The Macmillan Co., 1964.

Lewis, June E., and Potter, C. The Teaching of Science in Elementary School. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961.

McNally, Harold J., and Passaw, A. Harry. Improving the Quality of Public School Program. Columbia: Teachers College, Bureau of Publications, 1960.

Mouly, George J. The Science of Educational Research. New York: Appleton-Century-Crofts, Inc., 1963.

Ransey, William, and Burckley, Ramond A. Modern Earth Science. New York: Holt, Rinehart and Winston, 1961.

Richardson, John S. Science Teaching in Secondary Schools. New York: Prentice-Hall, Inc., 1957.

Sheckles, Mary. Building Children's Science Concepts. New York: Bureau of Publications, Teachers College, Columbia University Press, 1963.

Schneider, Herman and Schneider, Nina. Science in Your Life. Atlanta: D. C. Heath and Company, 1965.

Tanner, Daniels. Schools for Youth. New York: The Macmillan Co., 1965.

Taylor, Bob L., and Taylor, L. O. The American Secondary School. New York: Appleton-Century-Crofts, Inc., 1960.

Periodicals

Chinnis, Robert J. "Analysis of Elementary Science Textbooks," The Science Teacher, XXX, No. 1 (February, 1963), 23-27.

Hedden, James W., and Kenneth, J. Smith. "The Readability of Elementary Mathematics Books," The Arithmetic Teacher, XI, No. 7 (November, 1964), 466-68.

Irwin, Martin. "Evaluating the Elementary Literature Program," Elementary English, XXXX (January-December, 1963), 846-900.

Hofman, Helmut. "Children's Dream," Childhood Education (November, 1963), 143-46.

LaFleur, Helen. "What Students Need to Know About Science," What The Colleges are Doing, XCCI (April, 1962), 2.

Mallinson, George and Others. "The Reading Difficulty of Textbooks in Elementary Science," Elementary School Journal (April, 1950), 460-63.

Mellott, Malcolm E. "What To Look For in Choosing Textbooks," National Educational Journal, XXXXIV (March, 1955), 152-55.

Newport, John F. "Readability of Science Textbooks for Elementary Schools," The Elementary School Journal, XLVI, No. 1 (October, 1965), 10.

Porter, T. R. "Recent Advances in Elementary School Curricula," School Science and Mathematics, LXIII, No. 7 (October, 1963), 146.

Weaver, Edward K. "Philosophy for Science Education," Education, LXXX (September, 1959), 9-12.

Unpublished Materials

Cook, Sylvia. "A Treatment of the Negro in History Books." Unpublished Master's thesis, School of Education, Atlanta University, 1964.

Harris, Jimmie Edward. "Content Analysis of Ten Educational Administration Textbooks." Unpublished Master's thesis, School of Education, Atlanta University, 1964.

Haynes, Maurice W. "A Content Analysis of Fifth Grade Social Studies Textbooks." Unpublished Master's thesis, School of Education, Atlanta University, 1963.

Mullins, Bettye. "A Content Analysis of Six High School Chemistry Textbooks." Unpublished Master's thesis, School of Education, Atlanta University, 1962.

Sunday, I. Nwokorie. "Treatment of Africa and the Africans in Georgia Public School Textbooks." Unpublished Master's thesis, School of Education, Atlanta University, 1962.

Jacobs, Margaret A. "A Content Analysis of Three Educational Journals." Unpublished Master's thesis, School of Education, Atlanta University, 1962.

Wilburn, Bessie Hamilton. "A Comparison of Conent Analysis and Children's Reaction to Selected Types of Magazines." Unpublished Master's thesis, School of Education, Atlanta University, 1959.

Reports

National Education Association. From Bookshelves to Action. A Guide to using the recommendation of the NEA Project on Instruction. Washington: National Education Association, 1964.

U. S. Department of Health Education and Welfare. Education for Freedom and World Understanding. A report of the working committee of conference on the ideas of American Freedom. Washington: U. S. Government Printing Office, 1962.

VITA

JONES, Hattie Ruth C.

Education:	B.S. degree, Morris Brown College, Atlanta, Georgia; Graduate study, Atlanta University, Atlanta, Georgia.
Experience:	Presently employed as fourth grade teacher at Jefferson Franklin Beavers Elementary School, College Park, Georgia.
Personal Information:	Married. Member: Georgia Teachers and Education Association, Capital County Teachers Association and Mount Zion A.M.E. Church.

APPENDIXES

APPENDIX A

SCORE SHEET FOR EXAMINING TEXT FOR PHYSICAL MAKE UP

General Features	Probing Into Science			Concepts In Science			Today's Basic Science			Science in Your Life			Science for Tomorrow's World			Science Is Experi-menting			Science		
Rating	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1. Is cover of book attractive?	X			X			X			X			X			X			X		
2. Is binding durable?	X			X			X			X			X				X		X		
3. Are words spaced properly?	X			X			X			X			X			X			X		
4. Is print 14.0 to 18.0 or adapted to fourth grade level?	X			X			X			X			X			X			X		
5. Are the pictures attractive and well placed to go along with lesson?	X			X			X			X			X			X			X		
6. Are the quality and texture of paper good?	X			X			X			X			X			X			X		
7. Are illustrations well done and suitable to grade level?	X			X			X			X			X			X			X		
8. Is print easy to read?	X			X			X			X			X			X				X	
9. Is the paper flat or glossy?	X			X			X			X			X			X				X	
10. Is there a glossary?	X			X			X			X			X			X			X		
11. Is there a well organized index?	X			X			X			X			X			X			X		
12. Are sentences clear and understanding?	X			X			X			X			X			X			X		
13. Is there a manual for teacher?	X			X			X			X			X			X			X		

1 - Adequately or Highest
2 - Partially or second in rank
3 - Not at all

APPENDIX B

THE SEVEN SELECTED SCIENCE TEXTBOOKS

Title of Books	Authors	Copy-right	Publishers
Probing Into Science	Willard J. Jacobson Cecelia J. Lauby Richard D. Konicek	1965	American Book Co.
Concepts In Science	Paul F. Brandwein Elizabeth K. Cooper Paul E. Blackwood Elizabeth B. Hone	1966	Harcourt,Brace and World
Today's Basic Science	John G. Navarra Joseph Zafferoni	1963	Harper & Row
Science in Your Life	Herman Schneider Nina Schneider	1965	D.C. Heath
Science for Tomorrow's World	J. Darrell Barnard Cecelia Stendler James B. Bailey Wilbur L. Beauchamp	1966	Macmillan
Science is Experimenting	Glen Blough J. Stanley Marshall James B. Bailey Wilbur L. Beauchamp	1965	Scott-Foresman
Science	George G. Mallinson Jacqueline B. Mallinson John E. Steinberg Clarence R. Texler	1965	Silver Burdett